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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/842,802	04/27/2001	Takao Noguchi	206645US0	2819
22850 7590 01/11/2008 OBLOK, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER SONG, MATTHEW J	
			ART UNIT 1792	PAPER NUMBER
			NOTIFICATION DATE 01/11/2008	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com  
oblonpat@oblon.com  
jgardner@oblon.com

## Office Action Summary

**Application No.**

09/842,802

**Applicant(s)**

NOGUCHI ET AL.

**Examiner**

Matthew J. Song

**Art Unit**

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-7 and 9-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-7 and 9-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/ are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 1/4/08.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-2, 5-7, and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al (JP 11-312801), an English Abstract and computer translation (CT) have been provided, in view of Nashimoto et al (US 6,078,717).

In a method of a single orientation metal film for use in a ferroelectric film, note entire reference, Noguchi et al teaches a laminated thin film comprising a single crystal substrate of Si, a ZrO<sub>2</sub> thin film, a Y<sub>2</sub>O<sub>3</sub> thin film and a Platinum (Pt) thin film (CT [0055]). Noguchi et al also teaches a buffer layer containing at least one sort of Zr oxide and rare earth element oxide is

prepared and a metal film having a single (100) orientation is directly formed on the buffer (CT [0065]), this clearly suggests applicant's buffer layer including an oxide thin film of zirconium and an electrically conductive layer having (100) or (001) orientation directly on the oxide thin film. Noguchi et al also teaches the a variety of electronic devices, such as an optical modulator, may be formed by laminating a ferroelectric film on the laminated thin film (CT [0067]).

Noguchi et al also teaches the buffer layer contains zirconium oxide, a rare earth oxide or a part of Zr is substituted with a rare earth element or alkaline earth (Abstract), this clearly suggests an oxide layer consisting of  $ZrO_2$  because Noguchi et al teaches a single oxide layer can be  $ZrO_2$ .

Noguchi et al also teaches a buffer layer with a {111} facet side exists in the interface which touches the metal thin film which is an epitaxial film of cubic (100) single orientation (CT [0008]) and the growth of the metal film fills the crevice constituted by the fact side (CT [0011]), this clearly suggests applicant's oxide thin film comprising pits defined by {111} facet planes. It should be noted that the Noguchi et al reference is cited in applicant's specification and is relied upon by applicant to teach all of the features of the buffer layer and the conductive layer of the claimed invention, see pages 9-10 of the specification.

Noguchi et al does not teach forming a perovskite epitaxially on the buffer and forming a ferroelectric thin film having (100) and (001) orientation.

In a method of forming an optical device, note entire reference, Nashimoto et al teaches forming a platinum (100) layer on a substrate, epitaxially forming a perovskite layer comprising  $SrTiO_3$  (100) and epitaxially forming a PZT (100) layer, thereon (col 30, ln 60 to col 31, ln 15 and col 10, ln 45-55). Nashimoto et al teaches a PZT, this clearly suggests applicant's

ferroelectric film because applicant's teach a ferroelectric film comprising PZT, note instant claim 5.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Noguchi et al by forming a perovskite and ferroelectric layer on a platinum layer to form as useful waveguide device, as taught by Nashimoto et al.

Referring to the limitation requiring a ferroelectric film having (100) and (001) orientation, the combination of Noguchi et al and Nashimoto et al does not teach a ferroelectric film having (100) and (001) orientation, however this feature is expected to occur because the combination of Noguchi et al and Nashimoto et al teaches forming the ferroelectric film over a Si substrate, as applicants. Applicants teach a ferroelectric film may have a 90° domain structure comprising (100) and (001) oriented crystals under the influence of stresses from the Si substrate. Therefore, the ferroelectric film taught by the combination of Noguchi et al and Nashimoto et al is expected to have (100) and (001) oriented crystals because the crystals would be influenced by the Si substrate in a similar manner, as taught by applicant.

Referring to claim 2, the combination of Noguchi et al and Nashimoto et al teaches the  $\text{SrTiO}_3$  has a resistivity of less than  $10^4$  ohm-cm ('717 col 4, ln 10-65), this clearly suggests applicant's perovskite film has insulating properties because the film has a resistance.

Referring to claim 5, the combination of Noguchi et al and Nashimoto et al teaches PZT ('717 col 31, ln 1-15).

Referring to claim 6, the combination of Noguchi et al and Nashimoto et al teaches an optical waveguide device ('717 Abstract), this clearly suggests applicant's electronic device.

Referring to claim 7, the combination of Noguchi et al and Nashimoto et al teaches epitaxial deposition of a perovskite and ferroelectric layer ('717 col 30, ln 60 to col 31, ln 15) and forming a buffer layer on a Si (100) substrate ('801 English Abstract).

Referring to claim 9, the combination of Noguchi et al and Nashimoto et al teaches  $Y_2O_3$  ('801 CT [0055] and [0022]-[0023]).

Referring to claim 10-11, the combination of Noguchi et al and Nashimoto et al teaches the buffer layer is an epitaxial film of (100) or (001) orientation ('801 CT [0011]) and a conductive thin film can be (001) or (100) ('801 CT [0011]).

### ***Response to Arguments***

3. Applicant's arguments with respect to claims 1-2, 5-7, and 9-11 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571-272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song  
Examiner  
Art Unit 1792

MJS  
January 5, 2008

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*/Robert Kunemund/*

*Robert Kunemund*

*Primary Examiner*

*TC 1700*